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Working Memory and the feeling of success in students

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Abstract

Working Memory (WM) refers to the temporary storage and manipulation of the information. In order to perform complex tasks, having a cognitive basis, one must maintain access to a large quantity of information.
We assumed that WM is related to the students' feeling of success. The study indicates that variations in WM are related to variations in the feeling of success. The study shows also some differences in WM in women and men in the studied sample.

Keywords: Working Memory; success feeling; students; self-efficacy.

1. Introduction

Working Memory (WM) has been understood as an active storage system, responsible for the temporary maintenance and simultaneous processing of information (Bayliss et al. 2005). Dehn (2008) consider that "from a broad perspective, working memory is a central cognitive process that is responsible for the active processing of information."

From a more technical view, WM refers to the temporary storage and manipulation of the information within the nervous system (D'Esposito et al., 1995). In order to perform complex tasks, having a cognitive basis, one must maintain access to a large quantity of information. Also the (easy) accessibility to the information storage for a short period of time without rehearsal or re-activation is necessary (Ericsson & Kintsch, 1995).

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There are several approaches that consider WM similar to short-term memory. According to Dehn (2008) there are several differences between two forms of memory:

- While WM processes the data, short-term memory only stores the information, without any processing.
- While WM is less specific to different domains, short-term memory is domain specific (verbal and visual).
- WM is closely related to academic learning and with higher-level cognitive functions.
- WM consciously directs retrieval of needed information from long-term memory, while the short-term memory operates automatically with data stored in long-term memory.
- WM has some executive functions.
- WM operations are based very much on long-term memory structures, while short-term memory can operate independently.

2. Research Methodology

2.1. Purpose of the research

The main goal of this investigation is to take a closer look at the relation between WM and the feeling of success. We assumed that WM is related, in an unconscious mode, by the students' feeling of success. The research aims to study this relationship. Differences in terms of gender are also studied.

2.2. Instruments

One of the instruments is an working memory Test (WMT). The test includes 10 series, each of the series having 5 rows consisted of numbers and letters. The WMT reliability was verified by the test-retest method, correlation coefficient being $r=0.74$ ($p<0.01$), which indicates the test measure relatively stable the WM.

The other instrument is a short questionnaire measuring the feeling of success.

Both instruments have similar scoring systems (from 1 to 5) and comparisons can be made.

2.3. Participants

The research was conducted on a sample of 40 students from a Romanian university (engineering), 21 women and 19 men, aged from 19 to 31 years old ($M=21.52$).

2.4. Procedure

The instruments were administered by operators, according to instructions. The subjects were told about the purpose of the research, and that the information they will provide will be secured and they are free to participate in the research.

The smallest score on both instruments is 1 and indicates a low level for WM, respectively for the feeling of success which indicates a low academic performance. The highest score on both scales is 5, indicating that the subject has an efficient WM and the feeling of success is strong.

3. Results

Below the frequency tables by WM and feeling of success in the studied sample are shown.

Table 1. WM scores frequencies

WM					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	2.5	2.5	2.5
	2	3	7.5	7.5	10.0
	3	8	20.0	20.0	30.0
	4	14	35.0	35.0	65.0
	5	14	35.0	35.0	100.0
	Total	40	100.0	100.0	

Table 2. Feeling of success scores frequencies

SF					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	2.5	2.5	2.5
	2	6	15.0	15.0	17.5
	3	14	35.0	35.0	52.5
	4	18	45.0	45.0	97.5
	5	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

The WM average score is higher in men (4.68) than in women (3.23). Also the feeling of success average score is slightly higher in men than in women. Although the differences between men and women exist, they are not significant for the studied sample.

The main result in this study refers to the correlations between WM and the feeling of success in both men and women. Pearson correlation coefficient was also analyzed for both dimensions.

Table 3.Correlations

Correlations			
		WM	SF
WM	Pearson Correlation	1.000	.456**
	Sig. (2-tailed)		.003
	N	40.000	40
SF	Pearson Correlation	.456**	1.000
	Sig. (2-tailed)	.003	
	N	40	40.000

**. Correlation is significant at the 0.01 level (2-tailed).

It can be observed that there is a direct variation between the two dimensions, the correlation coefficient indicating this.

The scores variation by gender is shown in the Figure 1.

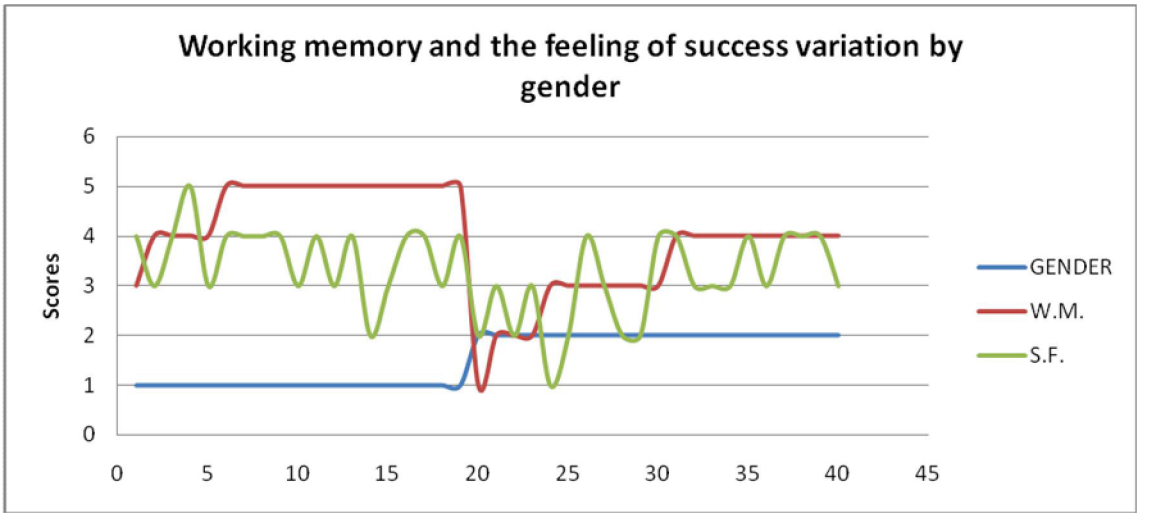

Figure 1. WM (red line) and feeling of success (green line) variation by gender (blue line)

4. Discussion

The study reflects the direct relation between WM and the feeling of success. The latter is close related to self-efficacy. Academic self-efficacy, as a context-related construct refers to people's beliefs about their own capabilities for successfully executing a course of action that leads to a desired outcome (Vasile et al., 2011). In the academic environment the academic self-efficacy is shown to be a strong predictor of the academic achievement.

Self-efficacy and the feeling of success make the difference in peoples' outcomes, as a follow-up of feeling and thinking. A low self-efficacy is associated with low results in the work, a low self-esteem and

negative thoughts about the individual's personal development and accomplishments. A high self-efficacy leads to a strong sense of competence, which helps cognitive processes and performance in areas such as academic achievement (*ibid.*).

The correlation between the two dimensions could lead us also to the assumption that the feeling of failure could adversely affect the Working Memory, lowering this way the cognitive performances in students and, of course, the academic performances.

Working memory is highly related to learning process. The knowledge is built or modified by the information processing within the Working Memory. WM processes make a difference between students in terms of learning. Here we could underline the implications of cognition in training students in the non-profile activities (Lupu, 2010).

The study indicates that a successful attempt to improve the Working Memory is close related to the subject's feeling of success. Encouraging students in the learning environments, giving them such tasks so they can become trustful in their cognitive capacities could be a way to help them to improve the WM and the learning process, all these leading to academic efficiency. Specific counseling of the students on how they could improve their WM (metamemory or metafunction) could be also necessary in order to improve the feeling of success.

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